Analyzer

BACKGROUND OF THE INVENTION

The present invention relates to an analyzer.

With an analyzer, various analyzer information is required when carrying out measurement or analysis. For example, in a thermal analyzer for measuring variations in material of a sample from variations in temperature, the following types of analysis information are required when performing measurement.

- A temperature program in which temperature control and measurement data sampling interval for a furnace, being a sample, are set.

- Sample information in which a name and shape value (size, weight) of a sample are set.

- Various constants used in device calibration

Measurement is carried out after these items of analyzer information have been set to appropriate values by an operator according to a sample to be measured and the purpose of measurement. By making it possible for once set analyzer information to be retained in a file or the like, it is also possible to carry out measurement by reading previously set analyzer information from the file.

The above described related art has the following problems.

- There is no means for confirmation with a procedure in which set contents of analyzer information is small.

With the analyzer of the related art, in order to verify analyzer contents currently being set, it is necessary to carry out verification by opening the place where analyzer information is set, for example, a setting window. Also, if the analyzer information being saved in a file or the like is not read out once from the analyzer, it is not possible to verify the contents. Analyzer information that becomes necessary for measurement such as the temperature program used at the time of thermal analyzer measurement, is also verified a lot of times, and operations such as opening a setting window each time this is done is extremely annoying to an operator.

This annoying operation can not be ignored in the field where the analyzer is used. Because the analyzer is extremely expensive, it is common for a single device to be used by many operators. There are also cases where a device administrator creates analyzer information, and a number of operators use this created analyzer information to carry out the respective analysis they are responsible for. That is, there are numerous cases where a plurality of items of analyzer information are commonly used in the field the analyzer is used, or where analysis is carried out in a manner allotted according to the purpose. For this reason, analyzer information is created successively, and so basically the numerous items of analyzer

information increase even more. When sharing the analyzer information, to find out necessary analyzer from within the large amount of analyzer information means for verification of the intended use of the analyzer information in is required in only a few procedures.

However, in the analyzer of the related art there are hardly any devices having means for verification of the intended use of the analyzer information etc. In order to make it possible to ascertain the intended use, there are also devices having means for affixing comments, but nevertheless these comments can not be verified unless the setting window is opened up, as described above. Because of this annoyance, in fields where analyzers are being shared, the intended use of the analyzer and the like impose an unnecessary burden on an operator who is already conveying a lot of information such as by oral reporting or in documents.

The present invention is intended to solve the above described problems, and makes it possible to verify set contents of analyzer information in a few procedures by providing an analyzer having means for holding information about intended use of analyzer information in association with the analyzer information, and automatically displaying the information being held simply upon selection of analyzer information by an operator. Further, unnecessary load on a user, due to numerous applications, such as management means

for large amounts of information or information transmission means in the case where analyzer information is shared by a lot of people, is reduced by having internal functions in an analyzer in which the contents of displayed information can be freely edited by an operator.

SUMMARY OF THE INVENTION

The present invention has been developed to solve the above problems, and the main parts of a structure to do this are user interface means 1, analyzer information 2, analyzer information storage means 3, analyzer information display designation means 4, comment creation means 5, analyzer information selection means 6, selection sensing means 7 and comment display designation means 8 (are shown in Fig. 1).

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic drawing of the present invention.

Fig. 2 is a software block diagram of an embodiment of the present invention.

Fig. 3 is an algorithm of an analyzer information selection routine of the embodiment of the present invention

Fig. 4 is an algorithm of an analyzer display routine of the embodiment of the present invention

Fig. 5 is an example of visual display of analyzer information in the embodiment of the present invention using icons.

Fig. 6 is an example of analyzer information selection in the embodiment of the present invention.

Fig. 7 is an algorithm of a comment creation routine of the embodiment of the present invention

Fig. 8 is an algorithm of a comment display routine of the embodiment of the present invention

Fig. 9 is an example of comment display in the embodiment of the present invention.

Fig. 10 is drawing explaining operation of the embodiment of the present invention.

Fig. 11 is drawing explaining operation of the embodiment of the present invention.

Fig. 12 is drawing explaining operation of the embodiment of the present invention.

Fig. 13 is drawing explaining operation of the embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention will now be described with a thermal analyzer as an illustrative example. A thermal analyzer is constructed of a personal computer, provided with an input device such as a keyboard or mouse for receiving input

from an operator and an output device such as a CRT for performing output to a user, and a measuring device, for carrying out measurement of sample material, connected to the personal computer using a communication line such as a network or serial communication.

The present invention is partially realized as thermal analyzer system software installed in the personal computer. Fig. 2 is a block diagram of this thermal analyzer system software.

The routine and all kinds of information shown Fig. 2 show the concreteness example of the constitution element of Fig. 1.

The user interface means 1 uses the input/output unit like CRT, keyboard, mouse etc. that the personal computer prepares. The analyzer information 2 is equal to the measurement information 10, analysis information 14, comment 20, related information 21. The analyzer information storage means 3 uses the memory storage of the personal computer. The analyzer information display designation means 4 materialize it as the software routine by the analyzer information display routine 16. The comment creation means 5 materialize it as the software routine by the comment creation routine 18. The analyzer information selection means 6 materialize it as the software routine by the analyzer information display routine 15. The comment display designation means 8 materialize it as

the software routine by the comment display setting routine 19. The selection sensing means 7 uses the event function that an operating system has.

Below the details are explained with regard to the function and action of each routine.

A measurement control routine 9 carries out control of the measurement device, and saves measurement data transmitted from the measurement device. In order for the measurement control routine 9 to perform control of the measurement device, measurement information is required. Before measurement commences, the operator performs setting of measurement information through a setting window displayed on the CRT. Alternatively, measurement information already saved as a file is selected in a selection window and read into the measurement control routine 9. A temperature program, sample information and various constants necessary for device calibration are contained in the measurement information 10. If the operator outputs a commence measurement command, the measurement control routine 9 sends control instructions to the measurement device according to set measurement information, receives measurement data sent from the measurement device and saves the data as a measurement data file 11.

A data analysis routine 12 performs analysis of the measurement data file 11, and saves analysis results. In the

data analysis routine 12, an operator selects an arbitrary measurement data file 11 by means of the selection window displayed on the CRT, and this data file is read into the data analysis routine 12. The data analysis routine 12 holds various methods for data correction and data analysis, and the operator designates an arbitrary method and data analysis in performed. At the time of analysis, analysis information is required and the operator sets the analysis information using the setting window. Alternatively, analysis information 14 already saved as a file is selected in a selection window and read into the data analysis routine 12. The analysis information 14 contains correction coefficients, and constants used in the analysis methods. Analysis results computed by the data analysis routine 12 are displayed on the CRT, and saved as an analysis results file 13.

An analyzer information selection routine 15 presents a cursor for selecting analyzer information visually displayed using the analyzer information display routine 16 (an algorithm is shown in Fig. 3). After an initialization process A1, cursor information is created using a cursor creation process A2, and a cursor is displayed on the CRT using the cursor display process A3. If the operator moves a mouse, a movement coordinate for the cursor is calculated from an amount of movement of the mouse using a movement information receiving process A4. In this way, an operator can operate the

cursor using the mouse. In this embodiment, a cursor is used, but any method can be used as long as there is means for designating and displaying analyzer information visually.

An analyzer information display routine 16 visually displays analyzer information such as measurement information 10 and analysis information 14, creates comments and displays the created comments (an algorithm is shown in Fig. 4). Once the analyzer information display routine 16 is launched by a command from the operator, after an initialization routine B1a list of currently existing measurement data 10 and analysis information 14 is created by an analyzer information acquisition process B2. Then, drawing information for displaying analyzer information as an icon is created by a drawing information creation process B3, and a window 22 having an array of icons 23, as shown in Fig. 5, is drawn on the CRT by an analyzer information drawing process B4. After drawing has been carried out, processing enters a message process loop B5 for the window. In the message process B5, message processing for notifying of events such as "the mouse has been moved in the window", "a mouse button has been clicked in the window" etc, is sent from the operating system. Message processing for the window is already well known technology in, for example, operating systems such as Microsoft Windows.

Because of the analyzer information display routine 16, the operator can verify the existence of analyzer information

at a glance using the displayed icons. In the embodiment, analyzer information is visually displayed using icons, but any form of display is possible as long as it is possible to visually display, for instance, buttons or a list of analyzer information file names.

An operator can select an arbitrary analyzer information icon being displayed by the analyzer information display routine, by operating the cursor presented by the analyzer information selection routine. Also, if an analyzer information icon is dragged and dropped into the main window of the measurement control routine 9 or a main window of the data analysis routine 12, this analyzer information can be used as set information. The concept of drag and drop is widely known using functions supported by operating systems.

In Fig. 6, If the cursor is moved from the cursor 24a to the cursor 24b, so that it then lies over the analyzer information icon 23, an on-mouse event is generated in the analyzer information display routine 16. An on-mouse event is an event notifying that the cursor has been moved into an own drawing region. If an on-mouse event is generated, the analyzer information display routine 16 calls a comment display routine 17 in the message process B5. Further, if the operator positions the mouse on the analyzer information icon and clicks the right button of the mouse, the analyzer information routine 16 generates a mouse right button click

event. If this happens, the analyzer information display routine 16 displays a pop-up menu in the message process B5. If the operator then selects a "create comment" item from the plurality of menu items, the analyzer information display routine calls the comment creation routine 18. Also, if the operator selects a "comment display setting" item from the menu items, the analyzer information display routine 16 calls a comment display setting routine 19.

The comment creation routine 18 is for creating and editing comments 20 for the analyzer information (an algorithm is shown in Fig. 7). After an initialization process C1, the comment creation routine recognizes what analyzer information has been selected using the analyzer information acquisition process C2, and displays an input window for input of comments for the selected analyzer information using an input window display process C3. The operator inputs a number of lines of comment 20, such as the intended use of the analyzer information, or transmission points for switching. If the input window is closed, the input comments 20 are saved by the comment save process C4, and related information indicating the type of comment 20 corresponding to the type of analyzer information is saved by the related information saving process C5. In the embodiment, the analyzer information and the comments 20 are held independently, and the relationship of

their correspondence is managed by the related information 21,

but any configuration is possible as long as the correspondence relationship of the analyzer information and the comments 20 can be ascertained.

The comment display setting routine 19 is for setting with respect to comments 20 for the analyzer information. A setting window is displayed, and whether to continuously display comments or not display them when an on-mouse event is generated can be selected by the operator.

The comment display routine 17 is for displaying comments 20 for the selected analyzer information (an algorithm is shown in Fig. 8). After an initialization process D1, the comment display routine 17 refers to related information 21 using a related information acquisition process D2, and acquires a relation between the analyzer information and the comments. The comment 20 corresponding to the selected analyzer information is then read using a comment acquisition process D3. If setting to carry out continuous display of the comment is made in the comment display setting routine 19, the comment 25 is displayed in the form of a pop-up menu as shown in Fig. 9. In this way the operator can recognize what the contents of the of analyzer information are at a glance using the displayed comment 25.

The embodiment is ultimately a method of recognizing analyzer information in a thermal analyzer using the present invention. For example, in the case where an arbitrary item of analyzer information is found from among a few tens of items of analyzer information and measurement performed, the following procedure is adopted. First of all, the operator launches a measurement control routine. A main window 26 of the measurement control routine is displayed on the CRT, as shown in Fig. 10 (the cursor 24 is continuously displayed). Next, the operator launches an analyzer information display routine. As shown in Fig. 11, the window 22 is displayed on the CRT, and a list of current analyzer information items is displayed in this window as icons 23. As shown in Fig. 12, the operator moves the cursor 24 to position the cursor over the analyzer information icon. As a result, as shown in Fig. 13, a comment 25 indicating the content of the analyzer information of the icon 23 where the cursor is positioned is automatically displayed. The operator can recognize if the analyzer information is what they are looking for by looking at the displayed comment 25. Even if there are a few tens of items of analyzer information, it is possible to recognize the contents by slowly dragging the cursor over the icons 23, which means that it is possible to find necessary analyzer information quickly. If analyzer information is found, it is possible to complete analyzer information setting by simply

dragging and dropping the icon for that analyzer information into main window of the measurement control routine. The operator can then commence measurement.

In order to recognize analyzer contents in a thermal analyzer of the related art, it was necessary to open a setting window for the analyzer information from a main window of a measurement control routine, then open an analyzer information selection dialog box from that window to select the analyzer information, and to read the analyzer information into the setting window and display that information. Since a procedure must be carried out involving opening the selection dialog box, selecting the analyzer information and then closing the selection dialog box, there are a lot of operations required to recognize the content of a plurality of items of analyzer information compared to the present invention.

As described above, the present invention provides a mechanism whereby an operator can create arbitrary comments for analyzer information, and it is possible to automatically display created comments simply by moving a cursor over a visual display of the analyzer information, such as icons. It thus becomes possible for an operator to recognize contents of a large amount of analyzer information with a few procedures.